UNITED STATES SPECIAL OPERATIONS COMMAND

Proposal Submission

The United States Operations Command's (USSOCOM) mission includes developing and acquiring unique special operations forces (SOF) equipment, material, supplies and services. USSOCOM is seeking small businesses with a strong research and development capability and an understanding of the SOF operational characteristics. The topics represent a portion of the problems encountered by SOF in fulfilling its mission.

Inquiries of a general nature or questions concerning the administration of the SBIR program should be addressed to:

United States Special Operations Command
Attn: SOAL-KS/Ms. Karen L. Pera
7701 Tampa Point Blvd.
MacDill Air Force Base, Florida 33621
Email: perak@socom.mil

USSOCOM will only accept proposals for those topics stated in this solicitation. The USSOCOM Program Executive Officers (PEOs) responsible for the research and development in these specific areas initiated the topics and are responsible for the technical evaluation of the proposals. Proposal evaluation factors are listed below and each proposal must address each factor in order to be considered for an award. Prior to December 02, 2002, scientific and technical questions may be directed to the topic author, and after that, through the DTIC SBIR Interactive Technical Information System (SITIS).

The maximum amount of SBIR funding for a USSOCOM Phase I award is $100,000 and the maximum time frame for a Phase I proposal is 6 months. A Phase I proposal for less than 6 months and/or less than $100,000 is encouraged where low risk technologies are being proposed.

USSOCOM will request Phase II proposals on a case by case basis. The proposal must be structured as follows: the first 10-12 months (base effort) should be approximately $375,000; the second 10-12 months (option) of incremental funding should also be approximately $375,000. A Phase II proposal for less than 24 months and/or less than $750,000 is encouraged. The maximum amount of **SBIR funding** allocated for a USSOCOM Phase II award is $750,000 and the maximum time frame for a Phase II award is 24 months. Proposals should be based on realistic cost and time estimates, not on the maximum time (months) and dollars. The cost of the project is based on the overall amount of hours spent to accomplish the work required and the overall term of the project should also be based on the same effort. In preparing the proposal, (including the plan of objectives and milestones), firms should consider that workload and operational tempo will preclude extensive access to government and military personnel beyond established periodic reviews.

Evaluation Criteria – Phase I & II

1) The soundness, technical merit, and innovation of the proposed approach and its incremental progress toward topic or subtopic solution.

2) The qualifications of the proposed principal/key investigators supporting staff, and consultants. Qualifications include not only the ability to perform the research and development but also the ability to commercialize the results.

3) The potential for commercial (Government of private sector) application and the benefits expected to accrue from this commercialization.

Selection of proposals for funding is based upon technical merit and the evaluation criteria included in the solicitation. As funding is limited, USSOCOM will select and fund only those proposals considered to be superior in overall technical quality and most critical. USSOCOM may fund more than one proposal in a specific topic area if the technical quality of the proposal is deemed superior, or it may fund no proposals in a topic area.

Electronic Submission Instructions

All proposal information must be received electronically via the DOD SBIR/STTR Submission site. A complete electronic submission is required for proposal evaluation. An electronic signature is not required on the proposal. Paper copies will not be considered. To submit, proceed to http://www.dodsbir.net/submission. Once your firm has been registered, you may prepare (and edit) Company Commercialization Report Data, prepare (and edit) Proposal Cover Sheets, complete the Cost Proposal form, and upload corresponding Technical Proposal(s). The proposal submission, exclusive of the Company Commercialization Report, must not exceed 25 pages.

Proposal evaluation will be accomplished via a secure web site. Please call (866) 724-7457 (SBIR Help Desk) for assistance in uploading proposals. Please note that there have been problems in the past with AOL uploads, therefore we suggest using an alternate internet service provider (ISP) for files larger than 5MB. It is strongly suggested the proposal be submitted 3-5 days prior to closing date to ensure complete submission. Firms are entirely responsible for complete and timely submission of the proposal. *Paper copies will not be considered.*

For additional information about electronic proposal submission, including uploading your technical proposal, refer to the instructions in the solicitation and the on-line help area of the DoD SBIR/STTR Submission site, or call the DoD SBIR Help Desk at 866-SBIRHLP (866-724-7457).

SOCOM 03.1 Topic List

03-001 Emitter Geolocation

03-002 SOF Micro Lab

03-003 SOF Life Support Monitor

03-004 Enhanced Image Capture and Transfer Capability

03-005 Antenna Enhancements for SOF Applications

03-006 Self-Mobile Trailier

SOCOM 03.1 Topic Descriptions

SOCOM 03-001 TITLE: Emitter Geolocation

TECHNOLOGY AREAS: Information Systems, Sensors

ACQUISITION PROGRAM: Joint Threat Warning System

OBJECTIVE: Special Operations Forces (SOF) lack a dynamic small package that will give them the ability to geolocate emitters they encounter. Having this capability will save lives during dangerous missions.

The purpose of this SBIR is to research, design, and create an integrated package that will permit on-the-move and stationary emitter geolocation capability using present and future SOF equipment. This capability will be part of the "toolbox" that a SOF user can pull off the shelf to use.

DESCRIPTION: Development of low power, miniature electronics to assist with the geolocation of emitters, offers placement possibilities not formerly possible. The designer will use the latest in commercial and government developed technologies to design a geolocation package to be used by deployed SOF personnel.

In keeping with our "toolbox" mentality, this SBIR seeks to design and build a family of geolocation products that a soldier can choose from and plug into existing receiving systems (body worn or manpack). The Proposer's design should not be "stove-piped" or standalone.

It is envisioned that this capability will be used the following way. SOF will enter an area. As they do so, they pull out this SBIRs developed miniature geolocation receiver package (henceforce referred as the Geolocation Field Unit (GFU)) that could be put into a tree or placed in the ground, then move on. One or more could be placed as they traversed. Alternatively, he could request an air drop of one or more GFUs into the area. As the soldiers move, they are using their Joint Threat Warning System (JTWS) or other SIGINT/threat warning receiver. If he locates a signal using the JTWS receiver that he wishes to geolocate, he loads the geolocation program, which initiates communication with the GFU(s) that have been placed, and automatically gives him the coordinates of the emitter source.

The GFU is envisioned to be a micro-size receiver, with an antenna, transceiver, and power source. It is preferred that these be compartmented and easily connected; if one part fails, then soldier has a backup. It cannot be overemphasized the need for the smallest size possible; the more electronics that takes up room in his backpack, the less room for food and bullets.

Due to the nature of missions, the GFU receiver packages may end up being throwaways; it may not be possible or it may be life threatening to retrieve the receivers. Therefore, the Proposer should seek to design this package to be produced at minimal cost.

For the air version, the above will need to be packaged into a hardened case that when dropped, and will always correctly implant itself when it hits the ground.

The main intent of the GFU receiver is to not be used for demodulation or remote receiving. The soldier will be detecting and identifying signals using his JTWS receiver, not the GFU. One idea would have the JTWS receiver detect the desired signal, the soldier would then run the geolocation software on the JTWS receiver, the JTWS receiver would then instruct the GFU(s) as to the frequency of the energy to geolocate. Since these GFUs need only assist with geolocation, SOCOM is looking for innovation to minimize size/power, yet still assist with geolocation.

The power module of the GFU should permit commercial and new power sources to be inserted into the designed package. The life between battery changes should be at least two weeks, with a goal of one month.

Communications between the threat warning receiver and the GFU(s) must be performed low probability of intercept/detection (LPI/LPD). The communications module of the GFU will connect to the receiver and power

module. Innovative proposals will use TCP/IP and allow GFUs to be both transmitters and relays for other GFUs, to conserve power and lengthen transmit distance. One suggested source of comms the proposer can leverage is a SOCOM SBIR that will be six months ahead of this SBIR, and is entitled, SOCOM 02-009, Analog/Video Communications Link (purpose is to research, design and build a family of inexpensive, rugged, small, low power tactical data/communication links for deployed SOF personnel. The system will use selectable transmission types that have a (LPI/LPD). It will be designed for both soldier to soldier and sensor to soldier; therefore it has direct benefit to this SBIR). The proposer is welcome to propose an alternative communications link between the main receiver and the geolocation packages. For the comms on the JTWS threat warning side, be aware that the present JTWS receivers have PCMCIA or CPCI card slots.

The soldier will be carrying a SIGINT or threat warning receiver. As of now, the proposed primary receiver to be used with this GFU is the SOCOM SBIR that is 1 year ahead of this SBIR, and is entitled, SOCOM 02-002,Portable Wireless Monitoring Station. The purpose of this SBIR is to build a small, manpack SIGINT/Threat Warning receiver. Proposer during phase 1 should be prepared to work with this SBIR's Phase 2 winner (you will be required to show proof of concept using this receiver during Phase 2). The soldier will most likely be wearing SOCOM's SBIR developed Body Worn Antenna (BWA). The BWA has omni and DF antennas. It is expected the DF will have 3 to 12 degrees accuracy. POC's for these SBIRs will be listed on the SITIS page.

Note: JTWS uses JCAF, the Joint Cryptologic Architecture Framework. With JCAF, any receiver will be able to be used by the operator. Possible other receivers that will be used; for manpack, the Digital Receiver Technology (DRT) and the Applied Signal Technology (AST) receivers, for body worn an AR-8200. At this writing, the exact receivers have not been chosen. JTWS uses the NT operating system, but innovative proposals will allow the software to be operating system independent. The software will attempt to be Joint Component Architecture and Framework (JCAF) compliant.

It is not envisioned that encryption will be needed for communication between the soldier's receiver and GFU(s). However, Proposers should be thinking of commercial encryption (probably software) while designing the system in case it is determined later to be needed.

Innovative proposals will:
* Permit the GFU to "sleep" to conserve battery life until awakened by the soldier's call for a geolocation from his receiver.
* Permit the GFU to first communicate with the soldiers receiver at full power, then quickly power down to a needed level in order to conserve battery life.
* Although the primary geolocation target signal will be cellular, a plus would permit geolocation of any signal in the JTWS Requirements (2MHz to 3GHz).
* The GFU software on the JTWS or other receiver is independent of the receiver or operating system.
* The GFU software on the JTWS or other receiver be capable of performing single source geolocation if no GFU's are available.
* For the ground version (non-air), a flexible or built in solar cell that lengthens battery life.
* Since the GFU is modular, a plus would permit additional battery modules to be added in order for the lengthen battery life if it is needed.
* Although it will increase the size, it may be advantageous to give the soldier more options such as allowing the GFU to be placed into camoflauge; such as it looking like a rock, tree, etc.
* Phase 2 Funds permitting, building of an extremely small "bodyworn" or belt worn receiver that communicates with the GFUs (and/or single source geolocation), in case the soldier does not want to carry a JTWS or other receiver. As a minimum, this receiver should work with the SOCOM developed body worn antenna (SBIR, SOCOM 01-007, Tactical Body Worn RF Antenna Vest).

The topic author is open to any innovative ideas on how to accomplish the above requirements, beyond what the author has proposed.

Proposers should budget for a single day trip to Tampa, Florida for a Phase 1 kickoff meeting.

Successful proposals will show previous or proposed use of novel technology to achieve substantial enhancements to equipment size, weight, performance, reliability, power consumption, data rate speeds, and/or cost.

Pluses include:
* Employees who have operational experience in the tactical and/or SOF arena;
* Leveraging of previous relevant SBIR, military, or commercial related technologies (please specify in detail);
* Fully demonstrating the proposing company's past and present experience;
* Supplying references on proposing company's products/programs (particularly government program managers);
* Giving detail on its proposed technologies to show expertise.
* Showing expertise in communications, fabrication, micro-receivers, or geolocation.

The proposal should detail the firm's experience in innovative advanced hardware and software design and familiarity on working with hardware. The proposer should be prepared to deliver products in accordance with the general information outlined in each of the phases as listed below:

PHASE I: The proposer in Phase 1 will perform the required research of needed technologies to meet and hopefully exceed the above requirements. Develop design for submission for a phase 2. Limited lab prototype verifying design a plus. The driving force behind this SBIR will be to make the GFU as small and low cost as possible (i.e. a throw away receiver); provide a cost estimate for Phase 2.

PHASE II: Develop system prototypes (two sets of two GFUs) within one year of start of Phase II. The GFUs will then be sent out for SOF tactical use and feedback. Incorporate feedback from users into a final design.

A final test will be required to demonstrate in a realistic tactical environment Conduct limited testing to prove feasibility over a seven-day mission scenario. Conduct environmental testing to determine feasibility of use from –10 to 50 C.

PHASE III DUAL-USE TECHNOLOGIES: This system will have immediate use on the war in terrorism. Athough designed primarily for SOF tactical operations, it will have applications in at least two PEO-IIs programs. It will also have application with the other military services (Marines and Army have expressed interest) and law enforcement agencies. Commercially this product could be spun off to enable remote monitoring of assets

REFERENCES:
DARPA: Small Unit Operations. http://www.darpa.mil/ato/programs/suosas.htm
"Wolfpack Hunts Down Enemy Emitters," AFCEA Signal Magazine, December 2001, pgs. 57-59. Magazine info: www.afcea.org/signal or signal@afcea.org

Darpa's Wolfpack program: www.darpa.mil/ato/programs/wolfpack.html

SBIR, SOCOM 02-009, Analog/Video Communications Link, located at:
http://www.acq.osd.mil/sadbu/sbir/solicitations/sbir022/socom022.htm

SBIR, SOCOM 02-002, Portable Wireless Monitoring Station, located at:
http://www.acq.osd.mil/sadbu/sbir/solicitations/sbir021/socom021.htm

SBIR, SOCOM 01-007, Tactical Body Worn RF Antenna Vest
http://www.acq.osd.mil/sadbu/sbir/solicitations/sbir012/socom012.htm

POC for JCAF information is Mike Niermann, SPAWAR Systems Charleston, niermanm@spawar.navy.mil, with "Request for JCAF information" in the subject line.

For an unclassified copy of the JTWS Operational Requirements Document (ORD), see the SITIS page.

Oklahoma State University has expertise in Instrumentation for Ultrafast Terahertz (THz) Optoelectronic Fabrication and Characterization, Nanoshell-Based Infrared and Terahertz Adaptive Materials and Devices, THz Impulse Scale-Ranging, THz Imaging, and Ultra-Sensitive THz Time-Domain.

Penn State University Applied Research Lab (PSU ARL) has expertise in the areas of propagation, antenna modeling/simulation, conformal design, fractal design, signal detection and geolocation, and SIGINT environment. Contact Mr. Jim Ross, jfr5@psu.edu, 814-863-2733.

Southwest Research Institute (SwRI), a nonprofit research institute in San Antonio, has extensive expertise in SIGINT, receivers, geolocation, and body worn antennas; contact Bobby Perez, boperez@swri.org, 210-522-2803.

Digital Receiver Technology (DRT) web page and contact info: www.drti.com, Ms. Cindy Solomon, Marketing Director, 301-916-5554 x151, csolomon@drti.com.

Applied Signal Technology (AST) web page and contact info: www.apsig.com, Mr. Kenneth Cumings, kcumings@appsig.com

KEYWORDS: GEOLOCATION, EMITTER, INTELLIGENCE, SIGINT, RF, RADIO FREQUENCY, LINK, COMMUNICATIONS, C-PCI, PCMCIA, REMOTE SENSING, TARGET, IDENTIFICATION

SOCOM 03-002 TITLE: SOF Micro Lab

TECHNOLOGY AREAS: Biomedical

OBJECTIVE: Design and build a compact, lightweight, portable laboratory kit that can be used to analyze parasites, bacteria and other pathogens in blood, urine, and body fluids. Laboratory must be capable of processing and providing specific analysis without the dependence of transporting specimen to another processing site.

DESCRIPTION: Advances in miniaturization of blood gas analyzers and other microchip technology combined with hand held data processors and the at home test kits are examples of the technology that may be applied to this capability. This device must have a means of self calibration for reliability. (Environmental stability of the calibration methods)

PHASE I: Develop overall system design to sample body fluids, blood and urine. As a minimum this device must test for complete blood count (CBC) with differential, complete urinalysis, Arterial Blood Gas (ABG) analysis, electrolytes, blood glucose, and streptobacteria. (Malaria)

PHASE II: Develop and demonstrate a portable prototype system in a realistic environment. Conduct testing to prove feasibility over extended operating conditions.

PHASE III DUAL-USE APPLICATIONS: This system could be used in a broad range of military and civilian applications. Use in rural medicine, remote locations, and Emergency Contingencies supported by other Governmental agencies.

REFERENCES: Joint Biological Agent Identification and Diagnostic System (JBAIDS) Operational Requirements Document (ORD) 7 May 02.

KEYWORDS: Micro Sensors, Medical, Laboratory tests and analysis

SOCOM 03-003 TITLE: SOF Life Support Monitor

TECHNOLOGY AREAS: Biomedical

OBJECTIVE: Design and build a compact, lightweight, handheld Critical Care Casualty Life Support Monitoring device that will provide real-time monitoring of critical care patients. This device should be capable of vital sign monitoring to include the recording of patient trends for up to twenty-four hours and be able to have expansion ports for additional monitoring devices.

DESCRIPTION: There have been numerous advances in miniaturization of noninvasive blood pressure (NIBP), pulse oximetry (SpO2), core temperature, heart rate, respiratory rate and other vital signs monitoring devices. Primarily these devices are used in a hospital or fixed facility settings. This device would be used in a far-forward life support role to monitor critically injured or severely ill personnel in austere or remote environments. In addition to the above mentioned vital signs, the ability to monitor Blood Glucose levels, a 3-5 lead EKG and End Tidal CO2 is also desired The device must have a means of self calibration for reliability. The device must have a self-contained battery and be able to be used in a field setting.

PHASE I: Develop overall system design to provide monitoring of heart rate, pulse oximetry, respiratory rate, noninvasive blood pressure, core temperature, and a 3-5 lead EKG.

PHASE II: Develop and demonstrate a portable prototype system in a realistic environment. Conduct testing to prove feasibility over extended operating conditions. Final design must be able to meet airworthiness certification and MIL SPEC 810C requirements.

PHASE III DUAL-USE APPLICATIONS: This system could be used in a broad range of military and civilian applications. Use in rural medicine, remote locations, and Emergency Contingencies supported by other Governmental agencies.

KEYWORDS: Micro Sensors, Medical, Laboratory tests and analysis

SOCOM 03-004 TITLE: Enhanced Image Capture and Transfer Capability

TECHNOLOGY AREAS: Information Systems, Sensors, Electronics

INTRODUCTION: Special Operations Forces (SOF) personnel currently have a deficiency within the reconnaissance mission area. Specifically, the ability to transfering collected data on legacy radios is limited by narrow band transmit and receive pathways (2.4 Kb-16 Kb) at a time when the the demand for this information has increased.

DESCRIPTION: In an effort to help address this problem this SBIR seeks a more effective means of moving data across existing resources. In particular, this SBIR seeks compression technologies which, when matched with state-of-the-art digital data collection, editing, and transmission devices would yield a powerful system for SOF reconnaissance missions. This SBIR seeks new compression algorithms, software, and hardware. A starting point could be seeking improvements on existing JPEG standard compression technologies, but both evolutionary and revolutionary approaches are encouraged. This SBIR also seeks integration of the compression technologies into a device that has on-board video capture card capability with software that will allow the device to be utilized with standard digital or analog cameras. Also, the device will need a modem and software that utilizes current military packet radio systems and be compatible with the Via Sat VDC-400 protocol. The following radios will need to be examined for interoperability considerations: MBITR, ASIP, MBMMR, PRC-117, and SINGARS. Finally, the device should include a display. Since size and weight are always of concern the complete device should weigh no more than three pound.

There are no specific system performance goals for this SBIR. Any advancement in data throughput this SBIR could provide would be of interest to SOF.

PHASE I: Propose and demonstrate data compression technologies that allow for significant increase in data throughput using existing military communication devices. Design a device that would provide a relatively small and user-friendly platform that incorporates the compression technologies and can be used to collect, edit, and transfer data files.

PHASE II: Develop and demonstrate a prototype system in a realistic environment and conduct testing to prove feasibility over extending operating conditions.

PHASE III: DUAL-USE APPLICATIONS: This system could be used in other platforms throughout the services where there is a need for image and video compression for transfer over limited bandwidths. There is significant demand for compression technologies in the burgeoning world of wireless applications.

KEYWORDS: Reconnaissance, compression, data throughput, data handling, software, displays.

SOCOM 03-005 TITLE: Antenna Enhancements for SOF Applications

TECHNOLOGY AREAS: Electronics

INTRODUCTION: The Special Forces have several missions, one of which is Special Reconnaissance. The SOF operator has a need to have a suite of reconnaissance tactical antennas that are available depending on the nature of the reconnaissance mission. Currently the antennas that are issued with the radio systems are all fixed mounted and have no Dbi signal gain characteristics to them. This forced configuration hinders the SR mission scenario because it does not allow signal transmission to be manipulated in such a manner as to enhance mission communications and capabilities. There needs to be a reconnaissance suite of antennas that will give mission flexibility to various environments and scenarios with improved antenna design both in form and function. With these antenna enhancements will come improved mission flexibility, which will increase transmission ranges of the existing legacy radio systems as well as maintain signal security (LPI/LPD) of particular SR missions.

DESCRIPTION: The objective of this task is to design and develop a suite of tactical LOS (Line of Sight) VHF/UHF FM/AM capable antennas. This suite of antennas will be compatible with current legacy radio systems. The antennas will improve over current legacy antennas by increasing transmission gain and by reducing form, both in size, weight, and functionality. By addressing these considerations the SOF operator will enhance his mission flexibility as well as his mission security profile.

PHASE I: Develop overall system design that includes considerations for antenna gain, form factor, clandestine, and weight.

PHASE II: Design and develop a prototype suite of antennas to be used in a realistic environment. Conduct testing to prove feasibility over extended operating conditions and terrain.

PHASE III DUAL-USE APPLICATIONS: This suite of antennas could be used in a broad range of military applications to include tracking and tagging. In addition, these antennas could have broader application within the larger service areas where antenna gain and weight are a factor as well. Lastly, this technology would enhance military intelligence communications efforts as well with its improved gain and clandestine capabilities.

KEYWORDS: none.

SOCOM 03-006 TITLE: Self-Mobile Trailier

TECHNOLOGY AREAS: Ground/Sea Vehicles

OBJECTIVE: Assist Special Operations Forces (SOF) operators moving increasingly larger mission loads to objective areas. SOF operators are required, or desire, to carry combat loads that exceed their carrying capacities. SOF operators need some kind of self-mobile vehicle capable of autonomously trailing a SOF foot patrol through any man-passable terrain.

DESCRIPTION: The transporter should be capable of carrying 1000 pounds of relatively high-density (therefore low volume) equipment. It should be steerable in case patrol desires to send it ahead, capable of way point (pre-programmed) navigation, and capable of receiving short-range communications and navigating to a beacon or coordinates. The transporter should also be capable of fording small rivers, whether it swims or walks across the bottom. It should be capable of silent operation, with low to no visible, radar or thermal signature. Vehicle should also be capable of carrying personnel, either seated or litterborne. Loaded vehicle should be transportable via

HMMWV, Naval Special Warfare Rigid Hull Inflatable Boat, MK V Special Operations Craft, CV-22 an MH60 or larger aircraft (thresholds), and the Advanced SEAL Delivery System.

Truly innovative proposals are sought for this SBIR. Previous investigation of systems of this nature included wheeled and tracked robotic vehicles, ultra-light aircraft, and air-delivered cargo containers. Problems with these solutions, at least for SOF, include signature and logistics tail.

PHASE I: Develop overall system design.

PHASE II: Develop and demonstrate a prototype system in a realistic environment. Conduct testing to prove feasibility over extended operating conditions and terrain.

PHASE III DUAL-USE APPLICATIONS: Conventional military operators would benefit from this system in the same way SOF would, however, there are some unique military situations that it would also support. Examples include moving patients or materiel around field hospitals, and rough terrain warehouse and construction site materiel transportation. This system, with its autnomous abilities, would be particularly useful in hazardous environments.

KEYWORDS: none.